

## *CHILOTHYNNUS*, A NEW GENUS OF AUSTRALIAN THYNNINAE (HYMENOPTERA: TIPHIIDAE) ASSOCIATED WITH ORCHIDS.

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### ABSTRACT

*Chilothynnus* gen. nov. is erected for six new species: *C. palachilus* sp. nov. (type-species), *C. boweri* sp. nov., *C. macraei* sp. nov., *C. rossi* sp. nov., *C. sandaracus* sp. nov. and *C. trochanterinus* sp. nov. All are described from the male. The males of at least *C. palachilus*, *C. sandaracus* and *C. trochanterinus* are attracted to orchids belonging to the genus *Chiloglottis*.

**KEYWORDS:** Tiphidae, Thynninae, *Chiloglottis*, *Chilothynnus*, Australia, new genus, new species.

### INTRODUCTION

The literature published on the pollination of Australian orchids by thynnine (Tiphidae: Thynninae) wasps has been reviewed by Armstrong (1979) and Adams and Lawson (1993). No work on the taxonomy of orchid-pollinating thynnine wasps has been published previously.

*Chilothynnus* is a distinctive genus of small wasps. Six new species are included. All are similar in appearance, and are most reliably distinguished by examining the male genitalia. At least three of these species can be attracted to the orchid flowers of *Chiloglottis* R. Brown (Orchidaceae: Dracaenaceae) using baiting techniques as described by Bower (1996).

Terminology follows Snodgrass (1941), Brown (1989) and Naumann (1991). Microsculpture is interpreted as follows: sparsely punctate = punctures further than two puncture-diameters apart; punctate = punctures at most two puncture-diameters apart but not confluent; closely punctate = punctures almost confluent; rugosely punctate = punctures partially confluent; finely punctate = small and shallow; and coarsely punctate = large and deep.

**Abbreviations.** Morphological characters: T1-7, metasomal tergites 1-7; S1-8, metasomal sternites 1-8. Specimen repositories: AM, Australian Museum, Sydney; ANIC, Australian National Insect Collection, CSIRO, Canberra;

BCRI, Biological and Chemical Research Institute, NSW Agriculture, Rydalmere; BMNH, The Natural History Museum, London; NTM, Museum and Art Gallery of the Northern Territory, Darwin. Collectors: CCB, C.C. Bower.

### SYSTEMATICS

#### *Chilothynnus* gen. nov.

**Type-species.** *Chilothynnus palachilus* sp. nov.

**Diagnosis of male.** Small (body length 4-10 mm) black wasps usually with yellow markings on the head and mesosoma, often with lateral spots on T2-4, often with legs at least partially orange, rarely with metasoma ferruginous. Clypeus narrowly raised medially, sagittally carinate and narrowly truncate. Antennal prominence broadly U-shaped, sagittally carinate. Apical 5 antennal segments arcuate. Propodeum longer than wide, gently curved in profile without clearly defined posterior declivity. Metasoma dorsoventrally compressed, not strongly sclerotised; segment 2 constricted anteriorly; segment 3 at most weakly constricted anteriorly; other segments not constricted. T1 longer than wide. S1 not strongly raised medially. Epipygium (T7) convex, strongly and coarsely punctate laterally, broadly impunctate medially. Hypopy-

gium acutely spinose laterally, rounded, truncate or pointed but not spinose apically. Genitalia with basal ring short and ring-like; aedeagus reaching to, or extending beyond level of paramere apices; parameres usually notched or lobed on ventral margin.

**Diagnosis of female.** Small, apterous, brown wasps. Pronotum almost flat without tubercles, depressions or sulci; T2 with basal, weak apical and two strongly raised transverse carinae on disc; S5 punctate.

**Etymology.** The generic name is masculine and derived from *Chiloglottis*, a genus of orchid pollinated by *C. palachilus* sp. nov., *C. sandaracus* sp. nov. and *C. trochanterinus* sp. nov.

#### KEY TO MALES OF *CHILOTHYNNUS*

(Only the female of *C. trochanterinus* is known)

1. a Hypopygium narrowly rounded, truncate or triangular apically (Figs 7-8) ..... 2
  - b Hypopygium broadly rounded apically (Figs 3-6) ..... 3
2. a All metasomal segments black (with or without pale oblique marks).....
  - ..... *C. boweri* sp. nov.
  - b Basal three metasomal segments orange ..... *C. sandaracus* sp. nov.
3. a Mid and hind trochanters spinose ventro-apically ..... *C. trochanterinus* sp. nov.
  - b Trochanters not spinose ..... 4
4. a Body length  $\geq 7$  mm; ventral margin of paramere lobed in profile (Fig. 10) .....
  - ..... *C. palachilus* sp. nov.
  - b Body length  $\leq 7$  mm; ventral margin of paramere not lobed in profile ..... 5
5. a Body length 5-7 mm; aedeagus swollen; parameres short and subtriangular (Fig. 13)..... *C. macraei* sp. nov.
  - b Body length 4-4.5 mm; aedeagus narrow and subparallel; parameres long and subtriangular (Fig. 12)..... *C. rossi* sp. nov.

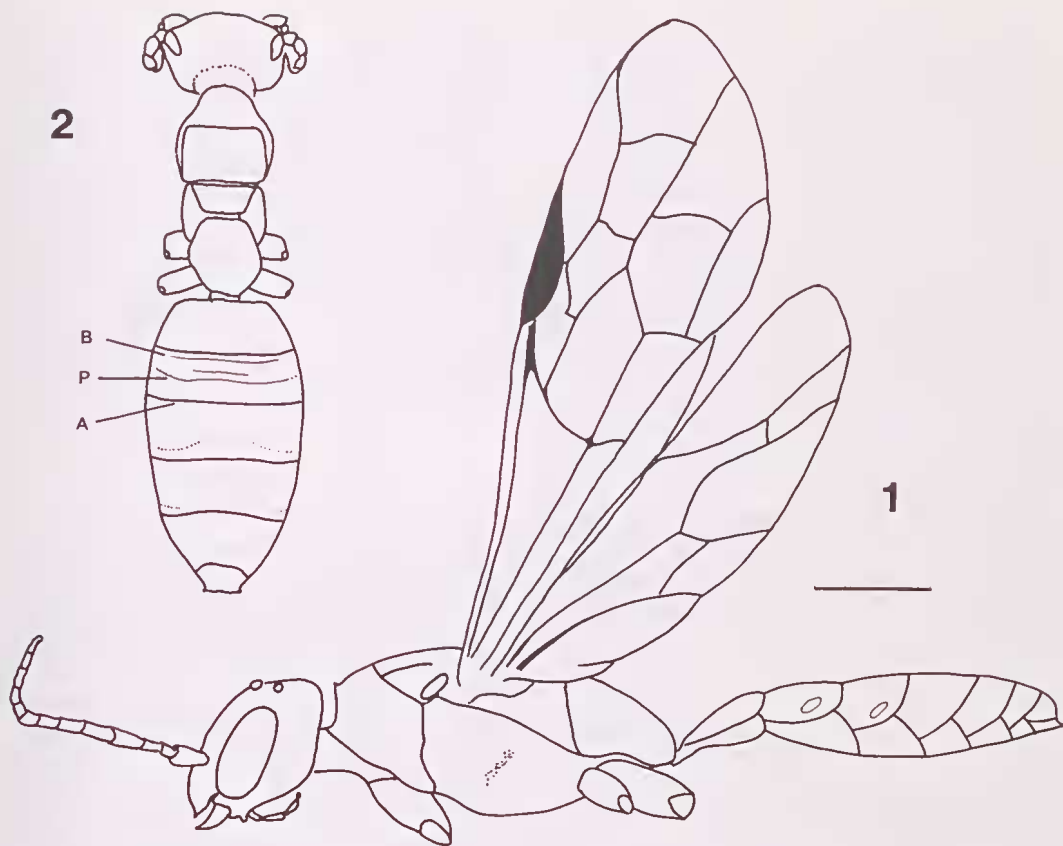
#### *Chilothynnus palachilus* sp. nov.

(Figs 1, 6, 10)

**Type material.** HOLOTYPE male - NTM (I593): Mt Kaputar, New South Wales, (site 3), attracted to *Chiloglottis palachila* ex Mt Kaputar, 7 November 1993, CCB. PARATYPES - NEW SOUTH WALES: AM, BMNH, NTM

(39 males), same data as holotype; AM, ANIC, BMNH, NTM (10 males); Mt Kaputar, (site 1), attracted to *Chiloglottis palachila* ex Mt Kaputar, 7 November 1993, CCB; AM, ANIC, NTM (5 males), Mt Kaputar, (site 3), attracted to *Chiloglottis chlorantha* ex Kanangra-Boyd NP, 7 November 1993, CCB; AM, ANIC, NTM (2 males), Mt Kaputar, (site 3), attracted to *Chiloglottis* aff. *palachila* ex Sunny Corner, 7 November 1993, CCB; AM, ANIC, NTM (6 males), Banksia Pt, New England NP, attracted to *Chiloglottis palachila* ex Barrington Tops, 2 December 1993, CCB; NTM (1 male), Banksia Pt, New England NP, attracted to *Chiloglottis pluricallata* ex Barrington Tops, 2 December 1993, CCB; NTM (3 males), Cathedral Rocks NP, attracted to *Chiloglottis palachila* ex Barrington Tops, 1 December 1993, CCB; AM, ANIC, BMNH, NTM (12 males), Yarrangobilly Caves Rd, Kosciusko NP, attracted to *Chiloglottis palachila* ex Barrington Tops, 8 December 1993, CCB; NTM (1 male), Mt Carson, 2 km E of Polblue Swamp, attracted to *Chiloglottis palachila* ex Mt Carson, Barrington Tops, 2 January 1994, CCB; AM, NTM (15 males), 0.5 km S of Big Murray Swamp, Barrington Tops, attracted to *Chiloglottis palachila* ex Mt Carson, Barrington Tops, 2 January 1994, CCB; NTM (3 males), New England NP. nr Platypus V[alley] L[ook]O[ut], attracted to *Chiloglottis palachila* ex Mt Carson, Barrington Tops, 31 December 1993, CCB; AM (1 male), Royal National Park, 28 November 1964, D.K. McAlpine; AM (1 male), Mt Banda Banda, 1200 m, 8 December 1986, D. Bickel; AM (2 males), Mt Tomah, December 1985, N. Rodd; AM (1 male), Mt Wilson, 29 November 1984, D.K. McAlpine and B. Day.

**Other material.** NEW SOUTH WALES: NTM (2 males), Barrington Tops, attracted to *Chiloglottis palachila* ex Barrington Tops, 9-10 January 1993, CCB; NTM (1 male), Banksia Pt, New England NP, attracted to *Chiloglottis palachila* ex Barrington Tops, 2 December 1993, CCB; NTM (1 male), Banksia Pt, New England NP, attracted to *Chiloglottis* aff. *palachila* ex Sunny Corner, 2 December 1993, CCB; NTM (1 male), Cockerill's Lookout, Kanangra-Boyd NP, attracted to *Chiloglottis palachila* ex Barrington Tops, 21 November 1993, CCB; NTM (15 males), Banksia Pt, New England NP, attracted to *Chiloglottis* aff. *palachila* ex Sunny Corner, 2 December 1993, CCB; ANIC (5 males), Kiandra, 20 December 1960, E.F. Riek.



Figs 1-2. 1. *Chilothynnus palachila* sp. nov., male, lateral. 2. *C. trochanterina* sp. nov., female, dorsal. A, apical carina of T2; B, basal carina of T2; P, preapical carina of T2. Scale line = 1 mm.

**Description of male.** Body length 7-10 mm; fore wing 5-9 mm; hind wing 4-7 mm. Clypeus closely and finely punctate. Frons closely punctate to rugosely punctate. Vertex and gena closely punctate. Pronotum finely and shallowly punctate. Mesoscutellum and mesoscutum closely punctate. Metanotum sparsely punctate. Propodeum closely punctate becoming transversely striate posteriorly. Mesopleuron closely punctate. Fore coxae with anteroventral surface slightly concave. Trochanters not spinose. Tergites closely and finely punctate. S1 closely and finely punctate. S2-4 almost impunctate. S5-8 punctate. Hypopygium broadly rounded apically. Genitalia as in Figure 10. Parameres elongate triangular with rounded ventral lobe.

**Colour.** Black; inner orbits ventrally and narrowly, anterior margin of pronotum narrowly, metanotum, lateral spots on T2-4 (largest on T2, smallest or absent on T4) pale yellow; legs orange; mandibles, ventral surface of basal 8 antennal segments, and small postocellar spot

brown. Setae white. Wings hyaline, veins dark brown to black.

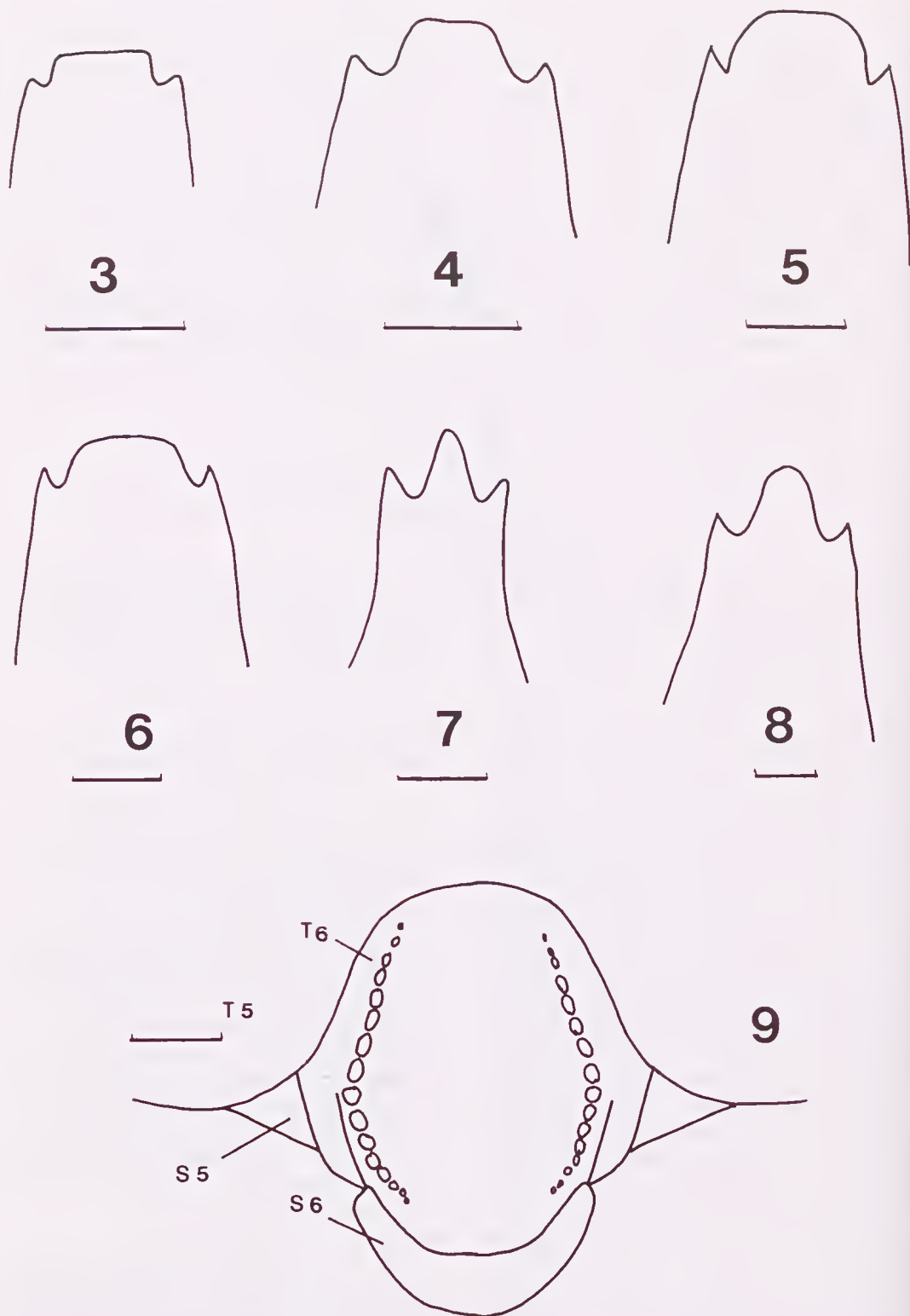
**Distribution.** Ranges of northern, central and southern New South Wales.

**Remarks.** Pale yellow marks on inner orbits, pronotum, metanotum, and T3-4 may be reduced or absent. Brown colouration on antennae may be absent.

This species pollinates *C. palachila* within the normal range of the orchid. However, some specimens were attracted to flowers of *C. chlorantha* D.L. Jones which had been translocated from Kanangra-Boyd NP, and *C. aff. palachila* which had been translocated from Sunny Corner. However, these wasps did not exhibit appropriate behaviour for pollination to occur (C.C. Bower pers. comm.).

Non type specimens (except those from Barrington Tops which were too damaged to be nominated as types) have the legs black rather than orange. In comparative experiments (C.C. Bower, pers. comm.) most of the New England





Figs 3-9. 3-8, apex of male hypopygia (S8): 3, *Chilothynnus rossi* sp. nov.; 4, *C. macraei* sp. nov.; 5, *C. trochanterinus* sp. nov.; 6, *C. palachilus* sp. nov.; 7, *C. boweri* sp. nov.; and 8, *C. sandaracus* sp. nov. 9, *C. trochanterinus* sp. nov., female, pygidium and apex of metasoma. Scale lines = 0.1 mm.

National Park specimens were preferentially attracted to *C. aff. palachila* rather than to *C. palachila*. No obvious differences between the genitalia of these two groups are evident. On the basis of these comparative observations, I am reluctant to consider them to be conspecific as structural differences in male genitalia are sometimes slight in closely related species. The Kiandra specimens have the apex of the hypopygium slightly more produced and almost broadly triangular.

**Etymology.** The species is named after the orchid it pollinates, *Chiloglottis palachila* D.L. Jones.

*Chilothygnus boweri* sp. nov.  
(Figs 7, 11)

**Type material.** HOLOTYPE male - NTM (1594): Travelling Stock Reserve (Olympic Way), Bendick Murrell, N of Young, New South Wales, 24 March 1988, CCB. PARATYPES - NEW SOUTH WALES: NTM (2 males), data as holotype; NTM (1 male), Mullion Ck, 14 March 1993, CCB; BCRI, NTM (3 males), "Daisy Hill", 152°10'E, 30°29'S, 11.5 km ENE of Wollomombi, ex Malaise trap, 28 November 1991 (trap 3), 4 February 1993 (trap 7) or 27 January 1994 (trap 6), A. Campbell and C. Haywood.

**Description of male.** Body length 4.5-5.5 mm; fore wing 3.5-4 mm; hind wing 2.5-3 mm. Clypeus closely and finely punctate. Frons closely punctate. Vertex and gena punctate to closely

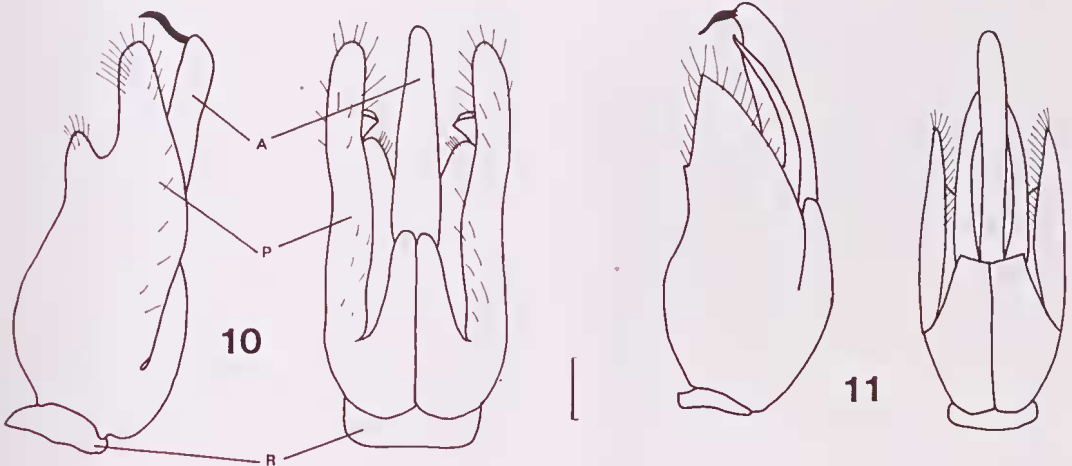
punctate. Pronotum finely and shallowly punctate. Mesoscutum closely and finely punctate. Mesoscutellum punctate. Metanotum sparsely punctate. Propodeum closely punctate. Mesopleuron closely punctate. Fore coxae with anteroventral surface broadly and shallowly concave, not tuberculate. Trochanters not spinose. T1-2 impunctate, T3-5 reticulate and finely punctate, T6-7 coarsely punctate. S1 closely and finely punctate. S2-8 reticulate, almost impunctate. Hypopygium triangular apically. Genitalia as in Figure 11. Parameres subtriangular with minute ventral tooth.

**Colour.** Black; mandible (except apex), margins of clypeus narrowly, inner and outer orbits ventrally and narrowly, margin of antennal prominence narrowly, pronotum with margins narrowly and small ventral spot, metanotum, tegula anteriorly, small dorsal spot on mesopleuron, lateral oblique mark on T2-4, small posterolateral spot on S2-4 pale yellow; legs orange to brown; small postocellar spot brown. Setae white. Wings hyaline, veins dark brown.

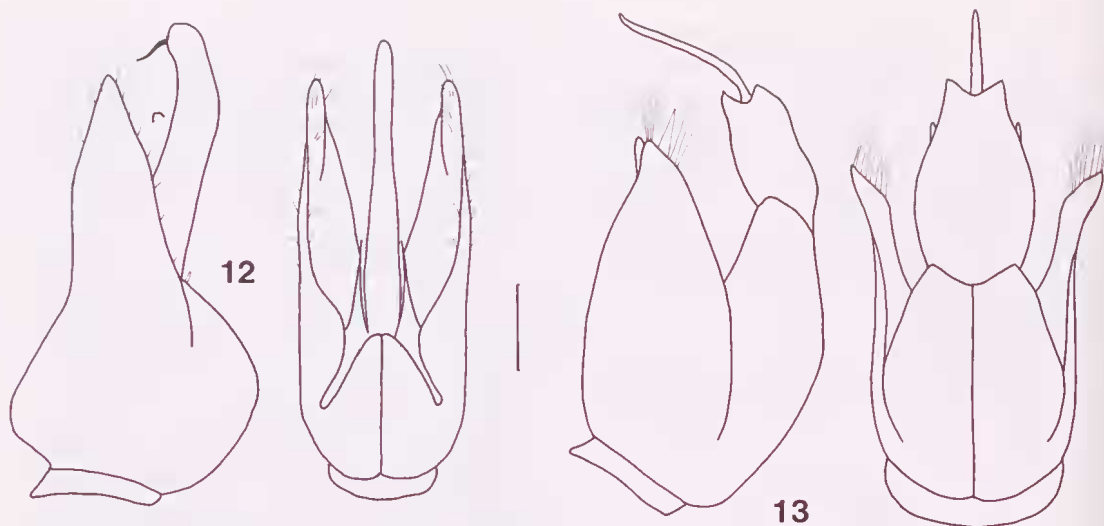
**Distribution.** Northern and southern Tablelands of New South Wales.

**Remarks.** Pale yellow marks may be reduced to absent on outer orbit, mesopleuron, T4 and S4.

**Etymology.** The species is named after Dr Col. Bower who has contributed greatly to our knowledge of orchid pollination and orchid pollinators.



Figs 10-11. *Chilothygnus* spp., male genitalia, lateral and dorsal: 10, *C. palachilus* sp. nov.; 11, *C. boweri* sp. nov. A, aedeagus; P, paramere; R, basal ring. Scale line = 0.1 mm.



Figs 12-13. *Chilothygnus* spp., male genitalia, lateral and dorsal: 12, *C. rossi* sp. nov.; 13, *C. macraei* sp. nov. Scale line = 0.1 mm.

*Chilothygnus macraei* sp. nov.  
(Figs 4, 13)

**Type material.** HOLOTYPE male - BCRI: "Fairburn", 152°10'E, 30°27'S, 11.5 km ENE of Wollomombi, New South Wales, ex Malaise trap, 15 October 1992 (trap 21), A. Campbell and C. Haywood. PARATYPES - NEW SOUTH WALES: BCRI, NTM (10 males), "Daisy Hill", 152°10'E, 30°29'S, 11.5 km ENE of Wollomombi, ex Malaise trap, 8 September 1991 (trap 1), 18 October 1991 (2, trap 1), 25 October 1991 (5, trap 1), 1 November 1991 (trap 5) 15 November 1991 (trap 1), A. Campbell and C. Haywood; QUEENSLAND: ANIC (1 male), Tewah Ck via Tin Can Bay, 17-18 October 1970, S.R. Monteith.

**Description of male.** Body length 5-7 mm; fore wing 4-5 mm; hind wing 3-4 mm. Clypeus closely and finely punctate. Frons closely punctate to rugosely punctate. Vertex rugosely punctate. Gena closely punctate. Pronotum punctate becoming rugose ventrally. Mesoscutum and mesoscutellum closely punctate to rugosely punctate. Metanotum sparsely punctate. Propodeum closely punctate becoming transversely striate posteriorly. Mesopleuron closely punctate to rugosely punctate. Fore coxae slightly convex, not tuberculate. Trochanters not spinose. Tergites reticulate and finely punctate, T6-7 coarsely punctate. Sternites almost impunctate. Hypopygium truncate apically. Genitalia as in Figure 13. Parameres subtriangular without ventral lobes or teeth.

**Colour.** Black; inner orbits of eyes ventrally and narrowly, margin of clypeus (except medially), margin of antennal prominence narrowly, margins of pronotum narrowly, and small dorsal spot on mesopleuron yellow; oblique lateral marks on T2-3 (often obscure or absent) pale yellow; apical margin of clypeus medially, legs (except coxae) and metasoma (except T1 and S1, and often T4 and T5) reddish orange; postocellar spot usually extending from outer orbit of eye to base of mandible brown. Setae white. Wings hyaline, veins light brown.

**Distribution.** South-eastern Queensland and northern Tablelands of New South Wales.

**Remarks.** The colour of this species is more variable than other species: yellow colouration may be limited to the antennal prominence while the legs and metasoma may be much darker, or black. Typically, specimens retain the yellow colouration on the head and pronotum, reddish-orange legs and some indication of reddish-orange on some metasomal segments.

Orchids of the genus *Chiloglottis* do not occur on or adjacent to the properties "Fairburn" and "Daisy Hill" (Mackay, Campbell, and Brown, unpublished). Three species of *Chiloglottis* (*C. anaticeps* D.L. Jones, *C. pluricallata* and *C. trilabra* Fitz.) do however, occur at nearby Cathedral Rocks National Park, but none of these are known to be visited or pollinated by *Chilothygnus* species (C.C. Bower, pers. comm.).

**Etymology.** The species is named after Allan McRae, the owner of "Fairburn".



*Chilothynnus rossi* sp. nov.

(Figs 3, 12)

**Type material.** HOLOTYPE male - BCRI: "Daisy Hill", 152°10'E, 30°29'S, 11.5 km ENE of Wollomombi, New South Wales, ex Malaise trap, 26 December 1991 (trap 1), A. Campbell and C. Haywood. PARATYPES - NEW SOUTH WALES: BCRI, NTM (6 males), as holotype (2) or dated 30 January 1992 (3, trap 7) or 21 January 1993 (1, trap 7).

**Description of male.** Body length 4-5 mm; fore wing 4-4.5 mm; hind wing 3-3.5 mm. Clypeus closely and finely punctate. Frons rugosely punctate. Vertex and gena closely and finely punctate. Pronotum closely punctate. Mesoscutum and mesoscutellum closely punctate. Metanotum sparsely punctate. Propodeum closely punctate becoming transversely striate posteriorly. Mesopleuron closely to rugosely punctate. Fore coxae convex. Trochanters not spinose. Tergites reticulate and finely punctate, coarser on T6-7. Sternites almost impunctate. Hypopygium broadly rounded apically. Genitalia as in Figure 12. Parameres elongate triangular without ventral lobes or teeth.

**Colour.** Black; mandibles (except apex), margin of antennal prominence narrowly, posterior margin of pronotum narrowly, metanotum and small dorsal spot on mesopleuron (often absent) yellow; oblique lateral mark on T2-3 (may be indistinct or absent) pale yellow; tibiae and tarsi orange to brown; small postocellar spot brown. Setae white. Wings hyaline, veins pale brown.

**Distribution.** Northern Tablelands of New South Wales

**Remarks.** Although not labelled as such, all specimens from "Daisy Hill" and "Fairburn" (including the other species described here) are ex ethanol, and the yellow colouration may have faded in these specimens.

**Etymology.** The species is named after Malcolm Ross, the owner of "Daisy Hill".

*Chilothynnus sandaracus* sp. nov.

(Figs 8, 14)

**Type material.** HOLOTYPE male - NTM (1595): Banksia Pt, New England NP, New South Wales, attracted to *Chiloglottis valida* ex Mt Canobolas, 2 December 1993, CCB. PARATYPES - NEW SOUTH WALES: AM

(1 male), Cheltenham, 9 September 1950; AM (1 male), Kurrajong, 26 October 1966, D.K. McAlpine and G.A. Holloway; AM (1 male), Lane Cove, 23 March 1946; AM (1 male), Mt Wilson, 16 December 1981, G.A. Holloway.

**Description of male.** Body length 9-10 mm; fore wing 7-8 mm; hind wing 4-5 mm. Clypeus closely and finely punctate. Frons coarsely rugosely punctate. Vertex and gena finely rugosely punctate. Pronotum closely punctate becoming finely punctate medially and rugosely punctate laterally. Mesoscutum and mesoscutellum closely to rugosely punctate. Metanotum sparsely punctate. Propodeum closely punctate becoming transversely striate posteriorly. Mesopleuron closely punctate. Fore coxae broadly and strongly concave with small erect apical tubercle. Trochanters not spinose. Tergites finely punctate, sparser on anterior segments, coarser on posterior segments. Sternites sparsely punctate, closely punctate posteriorly on S4-6. Hypopygium narrowly rounded apically. Genitalia as in Figure 14. Parameres triangular with apically setose ventroapical digitate lobe.

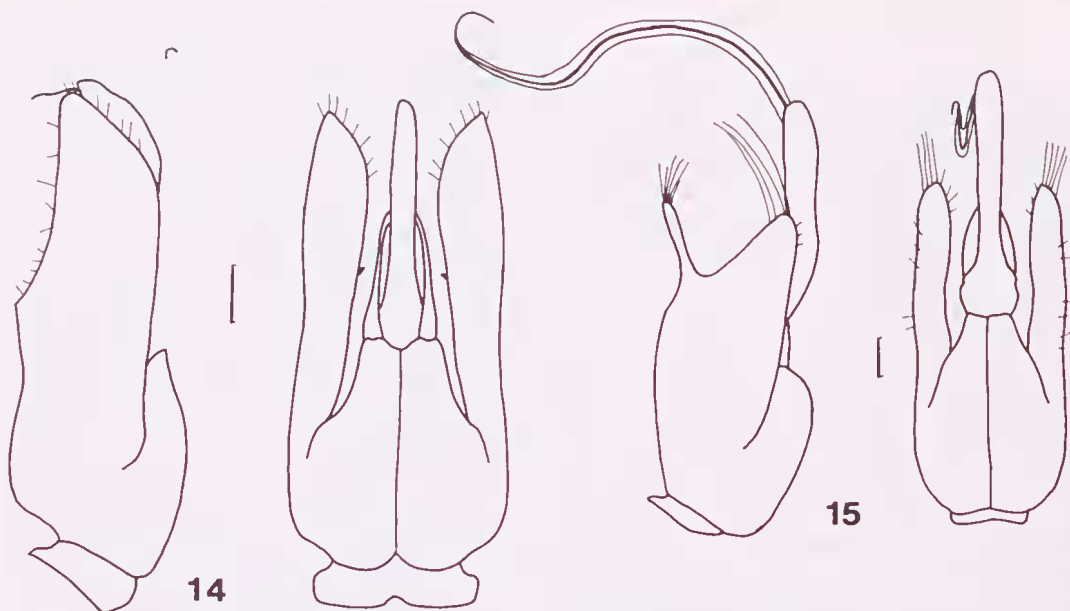
**Colour.** Black; mandible (except apex), margins of clypeus, inner orbits ventrally, margin of antennal prominence narrowly, anterior margin of pronotum narrowly, metanotum, and tegula yellow; transverse postocellar-postocular mark, legs (except coxae) and metasomal segments 1-3 orange. Setae pale yellow. Wings lightly infused with yellow, veins orange or dark brown.

**Distribution.** Coast and ranges of New South Wales.

**Remarks.** Black areas on the clypeus, basal eight antennal segments, lower frons, posterior margin of pronotum, discs of mesoscutellum and mesoscutum, metanotum laterally, propodeum and base of S1 may be orange.

This species was attracted to *Chiloglottis valida* D.L. Jones which had been translocated from Mt Canobolas, near Orange, to Banksia Point, New England National Park. *Chilothynnus palachilus* also occurs at Banksia Point and occurs at the same time of year as *C. sandaracus*. It is considered by C.C. Bower (pers. comm.) to be a minor responder to *C. valida* and is not regarded as a potential pollinator of this species.

**Etymology.** The specific name is derived from the Latin and refers to the colour of the basal metasomal segments.



Figs 14-15. *Chilothygnus* spp., male genitalia, lateral and dorsal: 14, *C. trochanterinus* sp. nov.; 15, *C. sandaracus* sp. nov. Scale lines = 0.1 mm.

***Chilothygnus trochanterinus* sp. nov.**  
(Figs 2, 5, 9, 15)

**Type material.** HOLOTYPE male - NTM (1596): "Kooroo", Calula Ra., Mullion Ck, New South Wales, attracted to *Chiloglottis* aff. *palachila* ex Sunny Corner, 9 November 1993, CCB. PARATYPES - NEW SOUTH WALES: AM, ANIC, BMNH, NTM (22 males), "Kooroo", Calula Ra., Mullion Ck, N.S.W., attracted to *Chiloglottis* aff. *palachila* ex Sunny Corner, 9 November 1993, 17 November 1993, CCB; AM, ANIC, BMNH, NTM (29 males, 2 females), "Kooroo", Calula Ra., Mullion Ck, N.S.W., attracted to *Chiloglottis chlorantha*, ex Kanangra-Boyd NP, 6 November 1993, CCB; NTM (1 male), Mullion Ck, attracted to *Chiloglottis* aff. *formicifera* ex Bald Rock [NP], 7 October 1994, CCB; VICTORIA: ANIC (1 male), 37°07'S, 142°24'E, 11 km WNW Halls Gap, 21 October 1983, I.D. Naumann and J.C. Cardale.

**Description of male.** Body length 9-10 mm; fore wing 7-9 mm; hind wing 5-6 mm. Clypeus closely and finely punctate. Frons, vertex and gena closely punctate to rugosely punctate. Pronotum finely and shallowly punctate. Mesoscutum closely punctate to rugosely punctate. Mesoscutellum closely punctate. Metanotum sparsely punctate. Propodeum closely punctate, trans-

versely striate. Mesopleuron closely punctate. Fore coxae with anteroventral surface with strongly concave depression. Mid and hind trochanters spinose ventroapically. Tergites reticulate and very finely punctate, T6-7 coarsely punctate. Sternites sparsely punctate, punctures becoming closer posteriorly and anteriorly on posterior segments. Hypopygium broadly rounded apically. Genitalia as in Figure 15. Parameres subparallel with small ventral lobe.

**Colour.** Black; mandibles (except apex), margin of clypeus narrowly, margin of antennal prominence narrowly, anterior margin of pronotum narrowly, minute spot anterior to tegula and mesoscutum anterior to tegula, metasoma, margins of mesosternal lamellae, lateral oblique mark on T2-4 (smaller on T4) and small posterolateral spot on S2-3 pale yellow; tibiae (except outer surface) and femora orange; fore trochanters variably orange to dark brown; small postocellar spot, outer surface of tibiae, and tarsi brown. Setae white. Wings hyaline, veins dark brown to black.

**Description of female.** Body length 5 mm. Head subrectangular, without depressions, slightly wider than long, posterior angles strongly rounded. Clypeus narrowly truncate, medially raised. Frons deeply and sparsely punctate, medially raised above antennae. Vertex deeply and sparsely punctate. Pronotum wider



than long, closely punctate. Propodeum obliquely truncate posteriorly, truncation closely and finely punctate, slightly longer than length of dorsal surface which is deeply and sparsely punctate, lateral surface and mesopleura reticulate. T1 vertically truncate anteriorly, dorsal surface testaceous with indistinct apical carina, preapical carina represented by curved line of punctures. T2 testaceous. T3-5 reticulate and closely punctate, testaceous posteriorly. Pygidium (T6) subovate with two rows of strongly developed punctures which diverge medially (Fig. 9).

**Colour.** Brown, antennae and legs paler, head and mesosoma darker.

**Distribution.** Ranges of Victoria and central Tablelands of New South Wales.

**Remarks.** In the male, the yellow marks on clypeus, mesoscutum, tegula and S3 may be reduced or absent.

Although strongly attracted to *C. aff. palachila* and *C. chlorantha*, this species occurs outside the range of, and in different habitats to, these orchids (C.C. Bower, pers. comm.) and the wasp is therefore not a natural potential pollinator of either species.

**Etymology.** The specific name refers to the distinctive mid and hind trochanters of this species.

## DISCUSSION

*Chilothygnus* belongs to the group which includes *Aeolothygnus* Ashmead, *Agriomyia* Guérin, *Ariphron* Erichson, *Leiothygnus* Turner, *Neozeleboria* Rohwer, *Pentazeleboria* Brown, *Phymatothygnus* Turner, *Psammothygnus* Ashmead, *Tachynomyia* Guérin, *Tachyphron* Brown, and *Zeleboria* Saussure. This group of 12 genera is distinguished from other Australian Thynninae by the combination of: a relatively short, weakly protruding hypopygium that is not broadened into lobes or spines at the base, and which may be armed apically with a narrow spine (with or without lateral spines); a convex epipygium that is uniformly punctate with a medial impunctate area, but without a transversely carinate apical margin; and the basiparameres not strongly developed ventroapically such that the ventroapical angle is well separated from the basal ring. *Chilothygnus* is distinguished from these genera by the combination of: a clypeus that has a well defined sagittal carina, and is narrowly produced and

truncate apically; and a hypopygium that is acutely spinose laterally and rounded, truncate or pointed, but not spinose, apically.

The structure of the clypeus is similar in *Ariphron*, *Tachyphron* and *Tachynomyia*, and to a lesser extent *Agriomyia* in which the carina is not sharply defined. A poorly defined or incomplete carina also occurs in some species of *Neozeleboria* and *Phymatothygnus*. However, these genera have the hypopygium apically spinose as do all other genera in this group except *Psammothygnus* and *Zeleboria* (although the spine may be modified, or reduced to a small swelling of the apical margin in some *Phymatothygnus*).

A sagittal carina is also present in *Psammothygnus* and *Zeleboria*, but the clypeus is greatly swollen and broadly truncate (probably as a result of the swelling). Both also lack an apical spine on the hypopygium which is emarginate in *Psammothygnus*, and apically rounded and often with a small lateral spine in *Zeleboria*. Some additional differences between these two genera are discussed by Brown (1995). *Chilothygnus* may therefore be most closely related to *Zeleboria*.

The six species described here are similar in appearance. Typically they are black with orange legs, with a few small yellow marks on the head and mesosoma, and pale yellow lateral spots on some tergites. However, colour is variable between specimens. In *C. macraei* it is particularly variable with the metasoma frequently having a red background, while in *C. boweri* the legs may be almost black, and the head and body of *C. rossi* may be almost entirely black. *Chilothygnus sandaracus* differs from the other species in that the basal three metasomal segments are orange, and metasomal spots are absent. Most species are known from relatively few specimens.

Relationships between the species are not clear due to the presence of very few morphological characters of diagnostic value. These are mostly limited to the shape of S8 and the genitalia. These include: spines on the trochanters and subparallel parameres in *C. trochanterinus*; a long apically filamentous aedeagus in *C. sandaracus*; a swollen aedeagus in *C. macraei*; and a tooth or small lobe on the ventral margin of the parameres in most species.

The majority of specimens examined here were collected by C.C. Bower using orchid baiting techniques which involve the exposure of

orchid flowers for one to two minutes in potentially suitable habitats (Bower 1996). Attracted wasps are then collected by hand netting. Because most of the orchids listed here are translocated (that is, picked, moved to another location, and then exposed to the environment to attract potential pollinators), most of the associated wasps cannot be considered the natural pollinators of these flowers. The only species of wasp known to pollinate an orchid within its native range is *Chilothynnus palachilus* (which pollinated *Chiloglottis palachila*). Other known wasp-orchid attractions are: *C. palachilus* to translocated flowers of *C. chlorantha* and *C. aff. palachila*; *C. trochanterinus* strongly attracted to translocated *C. aff. palachila* and *C. chlorantha*; and *C. sandaracus* weakly attracted to *C. valida*.

*Chilothynnus boweri*, *C. macraei* and *C. rossi* are not known to be attracted to orchids, but all are known from only few specimens, most of which were collected in Malaise traps. Perhaps coincidentally, all three species are amongst the smallest known thynnines with a minimum known size of 4-5 mm. Previously only *Asthenothynnus* and *Gymnothynnus* were known to contain species of such small size.

Almost all remaining specimens were collected by Malaise trap on the adjoining properties of "Fairburn" and "Daisy Hill". Twenty traps were operated in remnant vegetation stands, and out into adjoining pasture between 8 August 1991 and 3 February 1994 (Campbell and Brown 1994). Of 4,638 tiphiids trapped during this period, only three *C. boweri*, eleven *C. macraei* and four *C. rossi* were collected. During much of this period the area experienced drought and this probably resulted in low numbers of catches. Despite the high number of Malaise traps, low numbers of *Chilothynnus* wasps were caught. This suggests that other species of tiphiids may have been present in the area, but were in such low numbers that none were caught.

Nothing is known of the biology of this genus other than that males are orchid pollinators.

The genus is known only from south-eastern Australia, with all records from eastern New South Wales except one each from Victoria and south-eastern Queensland. The orchid genus *Chiloglottis* has a similar range, but extends into south-eastern South Australia and Tasmania (Jones 1988). *Chilothynnus* may have a simi-

lar distribution. Jones also records this orchid from New Zealand, but its occurrence may be an introduction as there are no thynnine wasps occurring in that country (Given 1953).

The distributions of *C. palachilus* and *C. sandaracus* are sympatric in the New England National Park. Similarly *C. boweri*, *C. macraei* and *C. rossi* all occur at Wollomombi.

Although there are relatively few collection records, it would appear that adult males are on the wing as follows: *C. macraei* and *C. trochanterinus* from September to November; *C. palachilus* from November to January; *C. boweri* from November to March; *C. rossi* from December to January; and *C. sandaracus* from September to March.

Females are known only from two specimens of *C. trochanterinus* from Mullion Creek.

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